Boll. Malacol., **44** (5-8): 109-112 (2008)

On the occurrence of *Anamenia gorgonophila* (Kowalevsky, 1880) (Solenogastres, Strophomeniidae) and its host *Paramuricea macrospina* (Koch, 1882) in the Maltese waters (Mediterranean Sea)

Constantine Mifsud* (✉), Francesco Mastrototaro# & Marco Taviani°

* 5, Triq ir-Rghajja, Rabat RBT 2486, Malta, kejdon@orbit.net.mt, (✉) corresponding author

Dipartimento di Zoologia, Università degli Studi di Bari, Via Orabona, 4, 70125 Bari, Italy

° ISMAR - CNR, Via Gobetti 101, 40129 Bologna, Italy

Abstract

A recent survey of deep-water coral banks in the Maltese archipelago provided a few living specimens of the Solenogastres *Anamenia gorgonophila* (Kowalevsky, 1880). The specimens were found at c. 500 m depth associated with one of its known hosts, i.e. the gorgonian *Paramuricea macrospina* (Koch, 1882). Both taxa represent first records in the Strait of Sicily.

Riassunto

Alcuni esemplari del Solenogastres *Anamenia gorgonophila* (Kowalevsky, 1880) sono stati rivenuti nella primavera 2007 durante l'esplorazione degli ecosistemi a coralli profondi a sud di Malta (Campagna MARCOS, nave oceanografica *Urania*). I Solenogastres sono stati rinvenuti a circa 500 m di profondità associati ad uno degli ospiti abituali, la gorgonia *Paramuricea macrospina* (Koch, 1882). Questo ritrovamento estende la distribuzione geografica di entrambe le specie al Canale di Sicilia.

Key Words

Solenogastres, *Anamenia gorgonophila*, gorgonian host, *Paramuricea macrospina*, deep-water coral banks, Maltese Islands.

Introduction

A major aspect of the current research on deep-water coral habitats regards the evaluation of their biodiversity (e.g., Jansen & Friederksen, 1992; Freiwald et al., 2004; Mortensen et al., 2005; Mortensen & Fosså, 2006; Zibrowius & Taviani, 2005). The Mediterranean Sea hosts a few well-developed deep coral sites with living *Lophelia pertusa*, *Madrepora oculata*, *Desmophyllum dianthus* etc. The best-known site is Santa Maria di Leuca in the Ionian Sea that is characterized by a relatively high biodiversity (Tursi et al., 2004; Taviani et al., 2005; Mastrototaro et al., submitted). Deep-water corals (DWC) do also occur in the Strait of Sicily where they form discrete coral banks south of Malta (Schembri et al., 2006).

A recent survey of these same coral banks conducted in springtime 2007 onboard RV *Urania* (CNR cruise MARCOS) provided various benthic organisms, including molluscs belonging to the class Solenogastres rarely reported in the DWC literature. The specimens have been ascribed to *Anamenia gorgonophila* (Kowalevsky, 1880), a species established from material collected from El Kala (La Calle), eastern Algeria (Kowalevsky, 1880). The Solenogastres were still associated with the gorgonian *Paramuricea macrospina* (Koch, 1882).

Anamenia gorgonophila is usually found attached to its host, colonies of gorgonians, and has been recorded previously for the Mediterranean by Nierstrasz & Stork (1940) and Salvini-Plawen (1990, 2006) but never from DWC habitats. Its known distribution includes the Azores and the Galicia Bank, Spain (Leloup, 1947 as *Anamenia heathi*; García-Álvarez & Salvini-Plawen, 2007), the western Mediterranean and the Gulf of Naples (Nierstrasz & Stork, 1940, as *Proneomenia nierstraszi*; Salvini-Plawen, 1990). The holotype of *A. gorgonophila* is missing and a neotype (the holotype of *Anamenia heathi* Leloup, 1947) has been designated by Salvini-Plawen (the "junior author" in García-Álvarez & Salvini-Plawen 2007: 132).

Material and methods

The Solenogastres under study were collected during cruise MARCOS at Station MS 65 (start: N35°30.76', E14°06.42', 585m; end: N35°30.857', E14°06.240', 492 m, 15/04/2007: **Fig. 1**) by using a short test of a small-volume epibenthic trawl. The Solenogastres were kept alive in the onboard aquarium for a few days and then fixed in 90 volume ethanol.

Samples of the study material will be deposited at the Natural History Museum of Mdina, Malta and at the Zoological Museum of the University of Bologna, Italy.

Results and Discussion

The bottom at stat. MS 65 prevalently consisted of hardgrounds with dead scleractinians (e.g., *Lophelia pertusa*, *Madrepora oculata*, *Desmophyllum dianthus*), *Corallium rubrum* and other gorgonaceans, serpulid tubes etc. *A. gorgonophila* (10 specimens) were found coiled to the branches of their gorgonian hosts *Paramuricea macrospina* (Koch, 1882) (**Fig. 2A-C**). The gorgonian colonies were themselves attached to coral rubble (small dead branches of the scleractinian *Madrepora oculata*) or to pieces of the hard substratum. The specimens of *A. gorgonophi-*

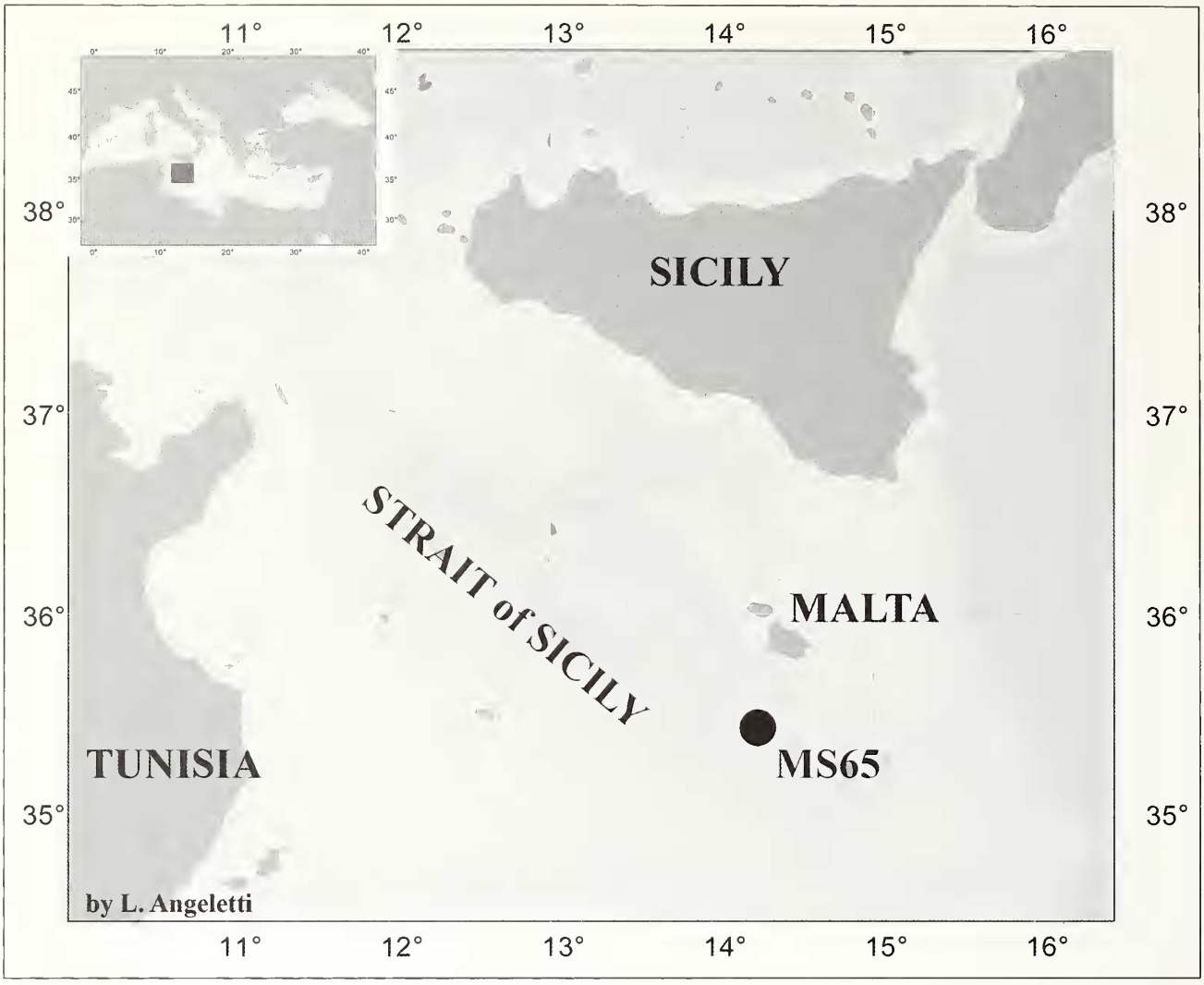

Fig. 1. Bathymetric map of the Strait of Sicily showing location of station MS 65.

Fig. 1. Mappa batimetrica del Canale di Sicilia riportante l'ubicazione della stazione MS 65.

la in the present study measured 18-22 mm in length and about 1-1.25 mm in thickness.

The genus *Anamenia* Nierstraz, 1908 (family Strophomeniidae) contains only a few taxa and is diagnosed as possessing epidermal papillae often pseudoepithelially arranged. The mouth is within the common atrio-buccal cavity. The radula is present and it is pectinate. The midgut is with constrictions. The secondary genital opening is generally paired. There are no copulatory stylets. The dorsoterminal sense organ is present. There are no respiratory organs (García-Álvarez & Salvini-Plawen, 2007). The mantle sclerites are also important for species determination. In *A. gorgonophila* (**Fig. 2D**) these are hollow acicular sclerites with a sharp pointed distal end (Leloup, 1947; Salvini-Plawen, 1990).

In the past *A. gorgonophila* has been cited as being found on the gorgonian host, *Eunicella filiformis* (Studer, 1879), and also especially on *Paramuricea* spp. (Salvini-Plawen, 1997). The depth at which the species is found ranges from 65-845 metres (Salvini-Plawen, pers comm.). The specimens in our study were coiled tightly along the colony of the host (**Fig. 2A, C**) and did not release themselves even after preservation in alcohol.

The gorgonian *Paramuricea macrospina* (Koch, 1882) is endemic to the Mediterranean and it is distributed along the French, Italian and Tunisian coasts, and in the Aegean Sea (Carpine & Grasshoff, 1975).

Conclusion

Anamenia gorgonophila parasitizes various species of gorgonians belonging to the genus *Paramuricea*. The finding of *A. gorgonophila* and its host *P. macrospina* is a new addition to the Maltese marine fauna and extends the distribution of this Solenogastres to the central part of the southern Mediterranean Sea.

Acknowledgements

We thank Captain, crew and the scientific staff onboard R/V *Urania* during cruise MARCOS. We are also indebted with Prof. L. v. Salvini-Plawen, Universität Wien, Austria, for his assistance on Solenogastres taxonomy. Map kindly prepared by L. Angeletti, ISMAR-CNR. Partial funding from EU HERMES (G0CE-CT200551112341) program and the Italian National Research Council (CNR) is gratefully acknowledged. This is IGM scientific contribution n. 1605.

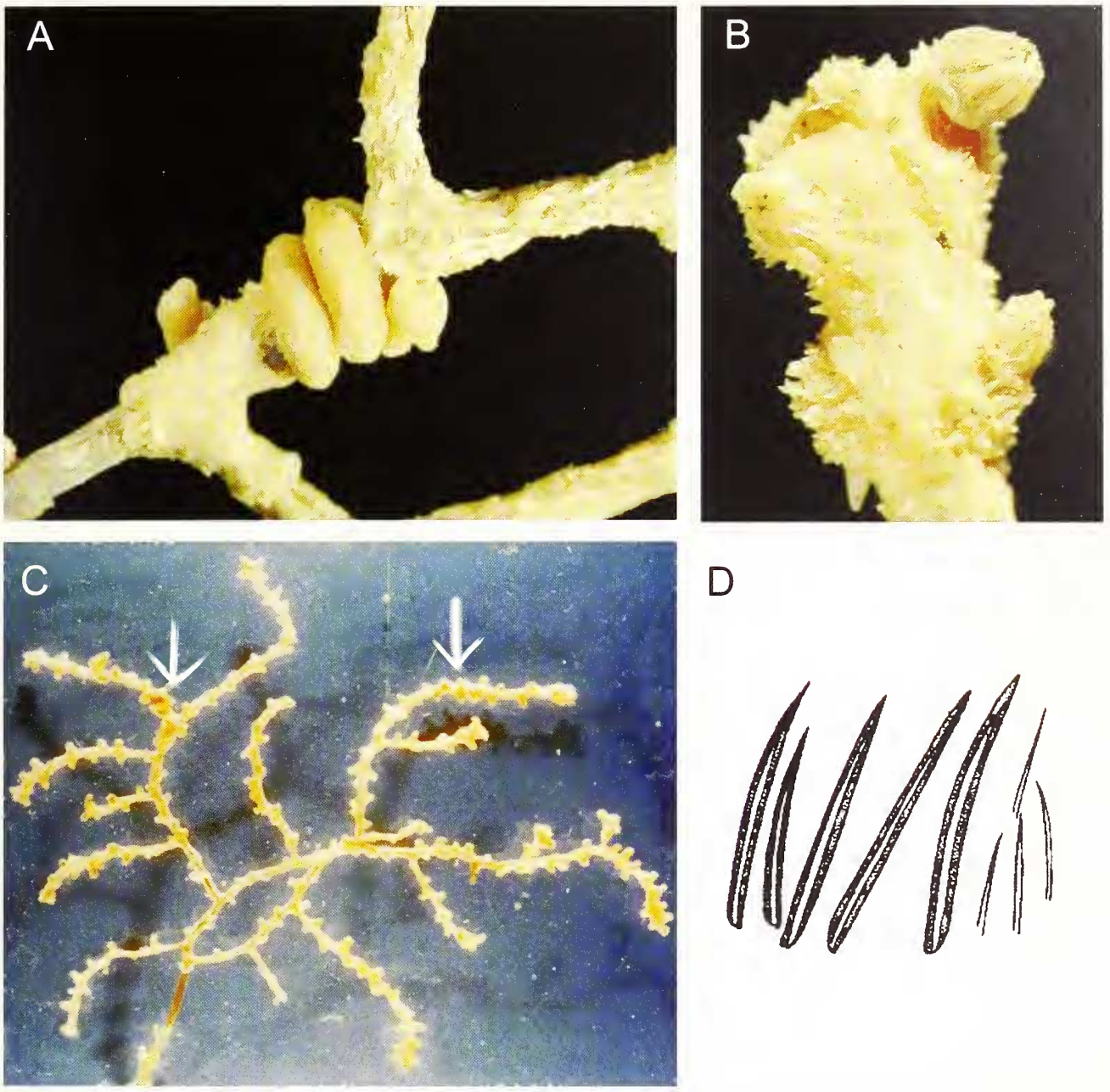

Fig. 2. A. Specimen of *Anamenia gorgonophila* coiled around the host *Paramuricea macrospina*. **B.** Detail of the gorgonian *P. macrospina*. **C.** A colony of *P. macrospina* with specimens (arrows) of *A. gorgonophila* attached. **D.** Mantle sclerites of *A. gorgonophila* (after Leloup, 1947).

Fig. 2. A. Un esemplare di *Anamenia gorgonophila* avvolto attorno all'ospite *Paramuricea macrospina*. **B.** Dettaglio della gorgonia *P. macrospina*. **C.** Una colonia di *P. macrospina* con esemplari di *A. gorgonophila* aderenti ad essa (frecce). **D.** Scleriti del mantello di *A. gorgonophila* (da Leloup, 1947).

References

Carpine C. & Grashoff M., 1975. Les Gorgonaires de la Méditerranée. *Bulletin de l'Institut Océanographique. Fondation Albert I, prince de Monaco*, **71** (1430): 1-140.

Freiwald A., Fosså J.H., Grehan A., Koslow T. & Roberts M., 2004. Cold-water coral reefs. UNEP-WCMC, Cambridge, UK, 84 pp.

García-Álvarez Ó. & Salvini-Plawen L. v., 2007. Species and diagnosis of the Families and Genera of Solenogastres (Mollusca). *Iberus*, **25** (2): 73-143.

Jansen A. & Frederiksen R., 1992. The fauna associated with the bank-forming deepwater coral *Lophelia pertusa* (Scleractinia) on the Faroe shelf. *Sarsia*, **77**: 53-69.

Leloup E., 1947. *Anamenia heathi*, sp. nov., Solenogastre de l'Océan Atlantique. *Bulletin du Musée Royal d'Histoire Naturelle de Belgique*, **23** (26): 1-11.

Mastrototaro F., D'Onghia G., Corriero G., Matarrese A., Maiorano P., Panetta P., Gherardi M., Longo C., Rosso A., Sciuto F., Sanfilippo R., Gravili C., Boero F., Taviani M. & Tursi A. An up to date on the knowledge of the biodiversity of the white coral bank off Cape Santa Maria di Leuca (Mediterranean Sea). *Deep-Sea Research* (submitted 2008).

Mortensen P.B. & Fosså J.H., 2006. Species diversity and spatial distribution of invertebrates on deep-water *Lophelia* reef in Norway. *Proceedings of 10th International Coral Reef Symposium:* 1849-1868.

Mortensen P.B., Hovland M., Brattegard T. & Faresrveit R., 1995. Deep water bioherms of the scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia*, **80**: 145-158.

Nierstrasz H.F. & Stork H.A., 1940. Monographie der Solenogastren des Golfes von Neapel. *Zoologica*, **99**: 1-92.

Salvini-Plawen L. v., 1990. The status of the Caudofoveata and the Solenogastres in the Mediterranean. *Lavori S.I.M.*, **23**: 5-30.

Salvini-Plawen L. v., 2006. Checklist delle specie della fauna

italiana. Solenogastres. *http://www.sibm.unige.it/CHECKLIST/principalechecklistfauna.htm*.

Schembri P.J., Dimech M., Camilleri M., Page R., 2007. Living deep-water *Lophelia* and *Madrepora* corals in Maltese waters (Strait of Sicily, Mediterranean Sea). *Cahiers de Biologie Marine*, **48**: 77-83.

Taviani M., Corselli C., Freiwald A., Malinverno E., Mastrototaro F., Remia A., Savini A., Tursi A., 2005. First geo-marine survey of living cold-water *Lophelia* reefs in the Ionian Sea (Mediterranean basin). *Facies*, **50**: 409-417.

Tursi A., Mastrototaro F., Matarrese A., Maiorano P., D'Onghia G., 2004. Biodiversity of the white coral reefs in the Ionian Sea (Central Mediterranean). *Chemistry and Ecology*, **20 (suppl. 1)**: 107-116.

Zibrowius H. & Taviani M., 2005. Remarkable sessile fauna associated with deep coral and other calcareous substrates in the Strait of Sicily, Mediterranean Sea, in Freiwald A., Roberts J.M. (eds), *Cold-water Corals and Ecosystems*. Springer-Verlag, Berlin, Heidelberg: 807-811.

Lavoro ricevuto il 14 maggio 2008
Lavoro accettato il 3 giugno 2008